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ABSTRACT

A rationale for computers in education in the Andover (Massachusetts) public schools, a curricular scope and sequence, a computer acquisitions plan, and a staff development summary are presented. The report is a result of an 18-month study of computers in education; pilot programs in the schools; and input from specialists in business, education, and industry. The rationale suggests that students must be provided opportunities tc use properly simple computer equipment, retrieve information from data banks, learn programming languages, appreciate the impact of computers on society, design information systems, use computers as a decision-making tool, and learn via computer aided instruction. The scope and sequence focuses on the educational use of computers from five viewpoints: as a teaching tool, technological device, social force, personal tool, and career tool. Recommendations are that elementary schools have one microcomputer per 15 teachers and secondary schools one per department; the number of student computers is determined on the basis of 30 minutes per student weekly. Staff development will include an introduction to the microcomputer, introduction to programming, instructional software evaluation, and instructional software implementation. Appendices include a history of the program (1981-1983) and proposals for 1983-1984, a log of student use of existing computers, a history of hardware acquisitions, and phase 1 of the Andover Educational Computing Program. (KC)

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ANDOVER PUBLIC SCHOOLS
ANDOVER, MASSACHUSETTS

# Educational Computing in the Andover Public Schools

Charles L. Mitsakos
Assistant Superintendent of Schools

January 1983

SP021893

Report of

The Computer Curriculum Committee

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## INTRODUCTION

This is a report of the Andover Computer Curriculum Committee on educational computing in the Andover Public Schools. The findings and recommendations are based on the district's eighteen month study of computers in education, pilot programs in our schools, and input from specialists in business, education, and industry.

The report includes a rationale for educational computing, a curricular scope and sequence, a recommended computer acquisition plan, and staff development summary. The appendix includes the two year history of educational computing to date and describes programs, student use, and equipment acquisition.

Upon school committee approval, a specific implementation plan with a specific hardware proposal within specified costs will be prepared.

## Rationale

Ten years ago the computer was considered a frill in education. Today, the computer is involved in most areas of modern life. The computer was used primarily as a sorting device, a machine designed to eliminate repetitive tasks and store quantities of information. Today, the computer is a vital tool used for decision making in large and small businesses. The home computer is rapidly becoming commonplace.

One of the long range goals of the public schools is to produce students who can participate intelligently as citizens in a computer-oriented society. Citizens should be prepared to function in the society by possessing a collection of skills, knowledge, concepts, and values designed to facilitate life in this technological era.

The Andover Public Schools must provide programs and services that enable students to develop those skills, knowledge, concepts, and values. Andover students must be involved in a formal study of computers and their uses in order that they might demonstrate a knowledge of this tool by learning how computers are changing our society; how computers work; and what computers do; and what they can do to make computers work for them.

Students in the Andover Public Schools must be provided opportunities to:

- Use properly simple computer equipment
- Retrieve information from data banks
- Learn programming languages
- Appreciate and understand how computers have impacted various aspects of society
- Experience a wide variety of simulations related to existing curriculum areas
- Design logical unique information systems
- Use computers as a decision-making tool
- Learn via computer aided instruction

The development of these opportunities should apply the theories of child growth and development as related to literacy in English. Such opportunities would enable students to develop the ability to read and write or as Luermann stated in Creative Computing

(Nov. 1981), "write for the computer and read what other people have written for the computer."

Students who can successfully demonstrate these skills, knowledge, concepts, and values and apply them would be computer literate and thus able to function comfortably as productive citizens in a computer-oriented society.

## Educational Computing Program

### OVERVIEW

Because the computer is a multi-purpose tool, we need to look at its educational use from more than one viewpoint. Teachers can use computers as tools for teaching many different subjects, in many different ways. Students should learn how to use computers in the many ways adults of the future will use them. In planning how the computer should be integrated into the curriculum, we have tried to reflect the following views of the computer:

As a Teaching Tool:

The computer may assist the teacher in teaching all subjects, not simply computer science. It offers:

- Drill and practice
- Tutoring
- Simulations and microworlds
- Data and word processing resources
- Information retrieval and storage

As a Technological Device:

Students need the basic ability to operate the computer as a black-box device with simple controls.

As a Social Force:

Students need to explore how the computer fits into their world, past, present, and future. They need to consider the social and ethical issues surrounding how computers are used, and will be used.

As a Personal Tool:

Students need to learn some of the many ways in which

computers can help them achieve their own personal goals, now and in the future. In particular, people can use the computer to help them to:

Learn and explore ideas
Write
Draw shapes, compose and produce music
Retrieve and store information
Communicate
Process and display data
Make models and decisions
Operate and/or control devices such as automobiles, home heating and cooling systems, and household appliances.

As a Career Tool:

Some students need to develop proficiency in using the computer as preparation for computer-related careers. Current areas include:

Writing
Accounting and finance
Programming
Science and engineering
Commercial art
Law
Medicine
Fine Arts
History
Manufacturing
Human Services
Music
Theology

## SCOPE AND SEQUENCE

I. As a Teaching Tool
   A. Use as a learning aid
      1. As a tutor
      2. For drill and practice

Basic skills remediation (below grade level objectives)

Drill and practice (at grade level objectives)

Problem solving (above grade level objectives)

B. For simulations - interdisciplinary units

1. Real world models to simulate situations when real world examples are historic, or too dangerous, expensive, or time consuming

2. Software which demands:

a. inference
b. interpolation
c. extrapolation
d. evaluation

C. Student will be able to use the word processor

1. Writing through technology

a. editing, revising, proof-reading written materials
b. creative writing
c. reports
d. auto hyphenation and justifications
e. auto spelling correction

2. Developing news items with all students

3. Developing new skills for students with special needs

a. language deficient
b. motor deficient

II. As a Technological Device

A. Student will be able to locate on keyboard:

1. letters, numbers, symbols

2. return key, space bar, control key, shift key

B. Student will be able to access the computer

1. Turn on and off computer properly

2. LOGON and LOGOFF (when applicable)

3. Utilize peripheral input/output devices:

disk drives
printers
cassette recorder
light pen

C. Student will be able to use system commands and interact with the computer. (Specific language and specific machine.)

(A) CATALOG or DIR
(A) RUN
(B) SAVE
(B) READ
(B) LOCK
(B) UNLOCK
(B) DELETE or KILL or ERASE

2. Immediate Commands

| | | |
|---|---|---|
| (B) | STOP | CP/M |
| (B) | CTRL G and C | CDOS |
| (B) | LIST | MP/M |

D. Students will be able to edit:

1. Erase
2. Alter a program or data
3. Use a preprogrammed module

E. Students will be able to demonstrate a knowledge of computer system components.

1. Identify the components
   a. Hardware
   b. Software
2. Understand functions of the components
   a. Hardware
   b. Software

III. As a Social Force

A. Student will be able to list and understand the impact of computers in daily life; e.g., at home, work, or school; in the marketplace; and at leisure.

B. Student will be able to understand the capabilities and limitations of computers.

1. Capabilities
   a. enhances creativity
   b. increases speed, accuracy, reliability, and consistency of what is being run
      b.1 performs repetitive tasks
      b.2 performs editing tasks
   c. stores, processes, and retrieves large amounts of data quickly
2. Limitations
   a. dependence upon human input
   b. finite storage capacity
   c. speed

C. Students will project future computer applications and the potential impact that they may have on their lives.

1. Career choices

   a. new jobs
   b. elimination of present jobs
   c. necessity for flexibility regarding career changes throughout life

2. Robotics

   a. automated control
   b. numeric control machines
   c. automatic mobile devices or $R_2D_2$

3. Artificial intelligence

4. New devices incorporating computer intelligence

D. Student will explore historical development of computational devices and how they relate to modern computers.

1. Counting

   a. fingers, pebbles, notches
   b. abacus
   c. Napier's bones

2. Mechanical

   a. Mannheim
   b. Pascal
   c. Leibniz
   d. Jacquard
   e. Babbage/Lovelace
   f. Hollerith

3. Electronic generations categorized by speed, size, and storage

   a. relays
   b. vacuum tubes
   c. transistor
   d. integrated circuit
   e. succeeding generations

E. Students will be aware of ethical implications of computer use and abuse:

1. Privacy - security

   a. types of records or lists
   b. computer deciphering techniques to protect data bases

2. Computer Crime

   a. rights of software ownership (copyright laws)
   b. unauthorized access to data banks

      1. illegal transfer of money
      2. illegal transfer and illegal use of information

c. corporate crime
d. public corruption

3. Potential for dehumanization of society

IV. As a Personal Tool

A. Use as a laboratory in which to develop critical thinking skills

1. By data analysis

a. situational problem-solving
b. student initiated projects
c. class projects

- student government elections
- real elections
- poll gathering - surveys
- school store - cost analyses and inventory
- individual grades
- budget allowance
- athletics - individual and team statistics
- energy studies

2. For problem solving/calculations

a. concrete
b. abstract - creative reasoning

3. Creating software to be used by other students

a. games
b. simulation
c. supplemental courseware

4. Other

a. writing/graphics
b. communications
c. data storage/retrieval
d. data processing
e. decision making/models

B. Programming Activities

1. Logo

Fundamental Logo Graphics Commands

FD BK LT RT plus input

DRAW

PC, BG } with number 0 - 5 for colors

PU, PD

HT, ST

Home

Draw - Immediate Mode
Length, Angles, Shapes

Repeat Instructions

Edit Mode
Writing simple procedures
Debugging - editing command
Sub procedures
Procedures with input
Simple recursion
Recursion with varying input
Conditional and stop rules

Logo Text (Numbers - words - lists)
Print statement
Numbers Computation
Words & Lists
Request command - Interactive programming
"Make" statement - Variable
Conditional if ... then

Logo Saving Procedures
Floppy disk
Save
Read
Catalog
Erase
Printers - Hard copy

2. BASIC

V. As a Career Tool

A. Word Processing skills

1. Secretarial
2. Report Writing
3. Journalism
4. Editing
5. Contracts
6. Specifications

B. Experiences in Programming Languages

1. Advanced Basic
2. PASCAL
3. Other languages

C. Business Applications

1. Accounting
2. Finance

3. Inventory Control
4. Forecasting
5. CAD/CAM

D. Technical Applications
1. Drafting
2. Mechanics
3. Art
4. Music

RECOMMEMDED COMPUTER ACQUISITION PROGRAM

1983 - 1986

| School (students) / Computer as: | South (450) | Sanborn (450) | Bancroft (600) | West (900) | Junior High Doherty (650) | Junior High West (750) | Andover High School (1300) | TOTALS |
|---|---|---|---|---|---|---|---|---|
| Technological Device 1 | 1 | 1 | 1 | 1½ | 1 | 1 | | 6½ |
| Teaching Personal Career Tool | | | | | | | | |
| For Teachers: 2 | ½ (2) | ½ (2) | ½ (3½) | ½ (5) | ½ (14) | ½ (14) | ½ (14) | 27½ |
| For Students: 3 | ½ (2) | ½ (2) | ½ (3½) | ½ (5) | ½ (14) | ½ (14) | ½ (14) | |
| | +17 | +17 | +22½ | +33½ | +19 | +23 | +45 | 204½ |
| Total need | 20 | 20 | 27 | 40 | 34 | 38 | 59 | 238 |
| Available | 2 | 2 | 3 | 4 | 9 | 9 | 8 | 37 |
| Rec. purchase | 18 | 18 | 24 | 36 | 25 | 29 | 51 | 201 |

1. Assumes 40 minutes/year/student
2. Elementary: 1 micro/15 teachers  Secondary: 1 micro/"department"
3. Assumes 30 minutes/student/week

SPECIFIC PLAN: 1983-1986

Over the next three years, we recommend pursuing a limited number of specific goals within the broad outline set forth above. As the following paragraphs describe, reaching each of these instructional goals requires the acquisition of a certain number of microcomputer systems for each school. The attached chart summarizes this hardware acquisition proposal.

One goal does not have immediate hardware acquisition implications: the exploration of the Computer as a Social Force. We assume that the basic familiarity with the computer needed to discuss this issue will be accomplished in the context of the remaining goals. In addition, we have re-ordered the goals for purposes of discussion, to reflect differences in the ways we have estimated hardware requirements.

1. COMPUTER AS TECHNOLOGICAL DEVICE

We consider it a high priority for every child in the Andover Schools to have the ability to operate a microcomputer as a simple device. Specifically, each child should be able to insert a disk, turn on the computer, catalog the disk, run a program, and interact with the program using single-key commands. We estimate this level of skill to require 40 minutes of computer time per year, per student. This would correspond to a total requirement of six and one-half microcomputers system-wide (as detailed on the summary sheet). In this calculation, as in all that follow, we have assumed that microcomputers can be effectively used 50% of the time, corresponding to 450 hours of computer time per microcomputer per year.

2. COMPUTER AS TEACHING, PERSONAL, AND CAREER TOOL

We also feel that every child in the Andover Schools should have at least a minimal experience with the use of the computer as a teaching, personal, and career tool. The nature of that experience should naturally reflect individual needs of the children, teacher preferences, and level of schooling. For example, we believe the emphasis at the

elementary level should be on interaction with teaching programs, with simple programming (Logo), and with word-processing. At the secondary level, this emphasis would gradually shift toward more powerful personal applications and especially career-oriented and college-preparatory uses of the computer.

We estimate that, to accomplish a minimal level of experience, each student should be able to work with a micro-computer for an average of 30 minutes each week. (This does not mean that each student will spend this amount of time each week. Over several years, however, each student should have this much access.) This will require a total of roughly 204 microcomputers system-wide.

In addition, however, effective instructional use of the computer requires knowledgeable and prepared teachers. Therefore, provision for inservice training, preparation activities, and software review must also be included here. Assuming half-time staff use, one microcomputer for every fifteen elementary teachers, and one microcomputer for most departments at the secondary level, should give teachers the access they need. (For these purposes, we have considered as departmental units the following: Language Arts, Foreign Language, Mathematics, Music, Fine Arts, Social Studies, Industrial Arts, Physical Education/Health, Business Education, Special Needs, Media, Home Economics, and Guidance.) These machines would be used for instruction the remaining half time, as reflected in the summary figures.

RECOMMEDATION

Although the level of microcomputer use proposed here is a minimal one, the cost is nevertheless fairly high. Assuming that one microcomputer system costs approximately $2000, the total acquisition budget over three years would be over $400,000. Servicing and training costs would be drawn from existing accounts for these purposes. However, these costs need to be viewed in perspective. A yearly acquisition budget of $133,000 represents an allocation of less than $27 per student per year over the three-year period, and of course the costs should be amortized over a longer period. In view of the importance of computer-related experience for children in this community, these costs are hardly excessive.

## STAFF DEVELOPMENT

Over 40 per cent of our professional staff will have successfully completed courses in educational computing and/or programming by the end of this school year. A language arts based software course is currently in full operation; a business education computer application course is about to begin. Three inservice courses in LOGO and BASIC will be offered beginning in March.

In addition by the end of this school year all staff will have had the following experiences:

1. Introduction to the microcomputer: controlling the hardware, that is, turning it on and off, inserting discs, responding to commands, etc.
2. Introduction to programming: overview of either LOGO or BASIC that helps teachers understand how programs are written and how they might, with further training, control software.
3. Instructional software evaluation: focus on the software that is available on the grade level or in the department with which teachers are working.
4. Instructional software implementation: nuts and bolts using the computers in the classroom either with small groups of students or with the class as a whole.

Costs for the above activities are drawn from regular school system inservice and professional improvement funds and Massachusetts Department of Education Commonwealth Inservice Institute grants. Further staff development with similar funding is assumed during the coming school year.

# APPENDIX

## History of Program

### OVERVIEW OF ELEMENTARY PROGRAM

| School | 1981-1982 | 1982-1983 | 1983-1984 (Proposed) |
|---|---|---|---|
| West Elementary | Computer literacy program for 215 sixth grade students & introduction to BASIC & LOGO as well as to tutorials, text-editing, games, and simulations on the computer. | Extension of program to selected fourth grade students and sixth grade students. | Introduce all students to computer as a tool. Introduce programming with LOGO in grades 3-6. Field test Project Quill writing software. |
| Bancroft | Computer literacy program through LOGO for 243 children in Lofts 1, 2, and 3 and for 6th grade students who have completed IMS. | Extension of program to the fourth graders who were in the third grade program and to students in the 4th, 5th, and 6th grades. | Introduce all students to computer as a tool. Introduce programming with LOGO in grades 3-6. Field test Project Quill writing software. |
| Sanborn | Program to teach 83 6th grade students how to write simple programs in BASIC -- thus developing logical analysis skills. | Extension of the program to 5th and 6th grade students. Implementation for primary grades as well | Introduce all students to computer as a tool. Introduce programming with LOGO in grades 3-6. |
| South | No equipment | Program to be implemented at grades 4 and 5. | Introduce all students to computer as a tool. Introduce programming with LOGO in grades 3-6. |

## OVERVIEW OF SECONDARY PROGRAM

| School | 1981-1982 | 1982-1983 | 1983-1984 (Proposed) |
|---|---|---|---|
| AHS | Math Department | | |
| | PDP with 5 terminals, 2 dec-writers, 1 printer. One semester elective course--BASIC programming--available in 5 sections to seniors. Enrollment approximately 300 students. | Add three sections of advanced BASIC programming; lab fully scheduled. | Add three sections of advanced BASIC programming; lab fully scheduled. |
| | Business Department | | |
| | Instituting Peach Tree Accounting Program with 2 micro-computers, with dual disks and monitors, and 1 printer. | Increase the number of students into the program. Field test word-processing program. | Implement computers in business course. Implement word processing program. |
| | English Department | | |
| | | Field test micro-computer as word-processor with classes in creative writing. | Implement word processing program as integral part of sophomore English course for all students and as an alternative medium for upper class writing electives |
| | Social Studies | | |
| | | Simulation programs in problem solving and decision-making skills. | Implement software |
| | Science | | |
| | | Field test micro-computers as lab instruments. | Implement software |

OVERVIEW OF SECONDARY PROGRAM (continued)

| School | 1981-1982 | 1982-1983 | 1983-1984 (Proposed) |
|---|---|---|---|
| EJH | Interested teachers learning BASIC programming language | Field test literacy program in lab. | Implement keyboarding course with grade 7 students. Implement computer literacy program for grade 7 students. |
| | English | Field test micro-computer as word-processor with classes in creative writing. | Implement software. |
| | Social Studies | Simulation programs. | Implement software. |
| | Foreign Language | | Implement modules developed at West Junior High. |
| | Mathematics | | Field test programming elective. |
| WJH | Interested teachers in literary and programming courses | Field test computer literacy program in lab. | Implement keyboarding course with grade 7 students. Implement computer literacy program for grade 7 students. |
| | English | Field test micro-computer as word-processor with classes in creative writing. | Implement software. |
| | Social Studies | Simulation programs. | Implement software. |
| | Foreign Language | Field test teacher developed software. | Implement teacher-developed software. |
| | Mathematics | | Field test programming elective. |

## USAGE OF MICROCOMPUTERS 1982 - 83

Sample of a 10 week period

| School | No. of Computers | No. of Students | Hands on time | Activities |
|---|---|---|---|---|
| Bancroft | 2<br>A 3rd machine, gift of the PTO, is housed in the media center & available to students & teachers on a sign up basis; presently being used at maximum. | 174 | Average 30 min. per week per team of 2 students | LOGO; MECC simulation & problem solving. Machines are scheduled for these activities 80% of school day. Remaining 20% is used on a sign up basis by teachers, aides, and/or students. |
| Sanborn | 2 | 256 | Varies from 6 - 30 min. per week per team of 2 students | LOGO;MECC simulation in the classroom; class of 6 perceptually handicapped learning LOGO. Machines are scheduled every period for students working in pairs or for class use. In addition 225 min. (before school, recess, time during lunch period) 1st graders use micros. Machines are scheduled 100% of the available time. |

| School | No. of Computers | No. of Students | Hands on time | Activities |
|---|---|---|---|---|
| South | 2 | 206 | Varies from 15-30 min. per week per team of 2 students | 4th & 5th grade students learning LOGO; all 2nd gr. children have had experience loading & running a learning program. Machines are being used 100% of school day. |
| West El | 4 | 321 (134 4th grade 157 6th grade 20 5th grade 10 gifted & talented) | Varies from 14-48 min. per student per week | Mostly drill & practice, tutorial, teacher management, simulation and informal teacher training Schedule is posted & machines are available 100% of the school day, before & after school. |

| School | No. of Computers | No. of students | Hands on time | Activities |
|---|---|---|---|---|
| WJH | 8 (computer lab) | 180 | 30 min. per week per team 2 students for 10 week period | BASIC course |
| | | 16 | each period of the day | Scheduled by class or individually. Filled to capacity. |
| | 1 (media ctr.) | | Maximum use. | Scheduled for simulation in the classroom & individual student or teacher use in the media center. |
| Doh. Jr. High | 8 (computer lab) | 220 | 80 min. per week for 10 weeks. | BASIC course. |
| | | maximum or 16 29 periods per week and from 2-3p.m. | | Available to any student who has passed the Computer Literacy test. |
| | 1 (media center) | | maximum use. | Scheduled for simulation in the classroom and individual student or teacher use in the media center. |
| AHS | 2 (media center) | | Maximum use. | One micro for student use - sign up. one micro - scheduled by teachers for simulation and problem solving in the classroom. |
| | 6 (business department) | - used exclusively by business department teachers and students | | |

ACQUISITION PROGRAM FOR ELEMENTARY SCHOOLS

| School | 1981-1982 | Approx. Cost | 1982-1983 | Approx. Cost | 1983-1984 | Approx. Cost |
|---|---|---|---|---|---|---|
| Bancroft | 2 micro-computers with disks and monitors<br>1 printer<br>software | $6,000 | | | 5 micro-computers with disks and monitors<br>1 printer<br>1 additional disk drive | $10,020 |
| Sanborn | 1 micro-computer with disk and monitor<br>1 printer<br>software | 3,000 | 1 micro-computer with disk and monitor<br>1 printer<br>software | 3,000 | 3 micro-computers with disks and monitors<br>1 printer<br>1 additional disk drive | 6,395 |
| West El. | 4 micro-computers with disks and monitors<br>2 printers<br>software | 12,000 | | | 7 micro-computers with disks and monitors<br>1 printer<br>1 additional disk drive | 13,647 |
| South | | | 2 micro-computers with disks and monitors<br>1 printer<br>software | $6,000 | 3 micro-computers with disks and monitors<br>1 printer<br>1 additional disk drive | 6,395 |

Upkeep: All equipment will carry a one-year warranty. If a machine under warranty will require more than 5 days to repair, an item will be loaned to us. Beyond the warranty, our technician will be able to handle repairs. He will participate in an intensive training program by the manufacturer. A check has been made with schools owning micro-computers about repairs after the warranty period. The majority have not had any major problems, as long as the disc heads are kept clean, and have not had service contracts which are approximately 10% of the cost of the equipment.

ACQUISITION PROGRAM FOR SECONDARY SCHOOLS

| School | 1981-1982 | Approx. Cost | 1982-1983 | Approx. Cost | 1983-1984 | Approx. Cost |
|---|---|---|---|---|---|---|
| AHS | Math Dept<br>PDP 8 - 7 terminals | Presently in use | Math Computer Lab<br>Deck Writer<br>Central processor<br>Printer<br>Interface & wiring | $7,000 less DEC grant, 50% | Classroom Use<br>7 micro-computers with disks and monitors<br>3 printers; disk drive | $15,944 |
| | | | | | Word Processor Lab<br>13 micro-computers with disks and monitors<br>4 printers | $23,305 |
| | Business Dept.<br>2 micro-computers with dual disks and monitors<br>3 printers | Presently in use | Business Dept.<br>4 micro-computers<br>4 monitors<br>1 printer<br>4 drives w cards<br>4 drives w/o cards | $10,000 (Grants from U.S. Oc. Ed. Program) | | |
| | | | Media Center<br>2 micro-computers<br>2 monitors<br>2 printers | $6,000 | Media Center<br>4 micro-computers with disks and monitors<br>1 printer<br>1 add. disk drive | 8,041 |
| Doherty J.H. | | | Computer Lab<br>8 micro-computers<br>8 monitors<br>1 Corvus System | 21,000 | Computer Lab<br>4 micro-computers with disks and monitors<br>1 printer<br>1 add. disk drive | 7,874 |
| | | | Media Center<br>1 micro-computer<br>1 monitor<br>1 printer | 3,000 | | |

ACQUISITION PROGRAM FOR SECONDARY SCHOOLS (continued)

| School | 1981-1982 | Approx. Cost | 1982-1983 | Approx. Cost | 1983-1984 | Approx. Cost |
|---|---|---|---|---|---|---|
| Doherty JH | | | | | Classroom Use<br>7 micro-computers with disks and monitors<br>3 printers<br>3 add. disk drives | $15,944 |
| WJH | | | Computer Lab<br>8 micro-computers<br>8 monitors<br>1 Corvus System | $21,000 | Computer Lab<br>4 micro-computers with disks and monitors<br>1 printer<br>1 add. disk drive | 7,874 |
| | | | Media Center<br>1 micro-computer<br>1 monitor<br>1 printer | 3,000 | | |
| | | | | | Classroom Use<br>7 micro-computers with disks and monitors<br>1 printer<br>1 add. disk drive | 15,944 |

ix

Implement Phase I of Andover Educational Computing Proposal

| GOAL | KEY PERSONNEL | TARGET DATE |
|---|---|---|
| 1. Conduct inservice sessions | | |
| a. LOGO for teachers | George Brackett | April 26, 1983 |
| b. BASIC | Jim Murphy | May 18, 1983 |
| c. Word Processing | Peggy Fenton | May 16, 1983 |
| d. AIRSWARE/Mastery Management | Gary Chadwell | May 31, 1984 |
| 2. Finalize specific goals for program | Assistant Superintendent with Computer Curriculum Committee and Key Teachers | |
| a. Elementary/junior high school | | May 23, 1983 |
| b. Keyboarding | | May 4, 1983 |
| c. Word Processing | | June 3, 1983 |
| 3. Complete preliminary edition of curricula | | |
| a. Keyboarding | Typing Teachers | May 27, 1983 |
| b. Educational Computing | Computer Curriculum Committee | June 10, 1983 |
| 4. Identify specific hardware to implement | Annetta Freedman<br>George Brackett<br>Assistant Superintendent | June 17, 1983 |
| 5. Conduct training sessions for school administrators on Phase I | George Brackett | July 1983 |

| GOAL | KEY PERSONNEL | TARGET DATE |
|---|---|---|
| 6. Conduct awareness sessions with staff | Principals | September 8, 1983 |
| 7. Develop model to monitor implementation of Phase I | Assistant Superintendent<br>Instructional Specialists<br>Assistant Principals | September 30, 1983 |
| 8. Implement Phase I | | |
| a. Keyboarding | Junior High School Typing Teachers | September 12, 1983 |
| b. Computer literacy | Junior High School Math Teachers | September 19, 1983 |
| c. Word processing | High School English Teachers | September 19, 1983 |
| d. Awareness/instruction | Classroom Teachers | October 1, 1983 |
| e. Programming | Math Teachers | September 19, 1983 |
| f. Field test software | Classroom Teachers | October 1, 1983 |
| 9. Conduct community awareness/ community use activities | Assistant Superintendent<br>Department of Community Services | October 15, 1983<br>October 1, 1983 |
| 10. Additional inservice for staff | Computer Consultant and Key Andover Staff | December 1983<br>May 1984 |
| 11. Conduct preliminary evaluation | Evaluation Consultant<br>Instructional Specialists/ Assistant Principals | January 15, 1984 |
| 12. Conduct final evaluation of Phase I | Evaluation Consultant<br>Instructional Specialists/ Assistant Principals | May 1984 |